Claims

1. A method for preparing a diffraction-based diagnostic biosensor film comprising the steps of:

a) providing a receptor solution comprising a receptor and a carrier fluid,

b) applying the receptor solution to a printing cylinder having a longitudinal axis and an engraved pattern of cells, each cell having a width, height, and depth for acceptance of the receptor solution, the printing cylinder being rotated about the longitudinal axis,

c) transferring the receptor solution from the rotating printing cylinder to a substrate, and,

d) drying the printed substrate,

wherein the dried receptor forms a pattern comprising individual printed areas having a center-to-center spacing ranging from about 0.1 microns to about 100 microns.

2. The method of claim 1 wherein the receptor comprises a protein.

3. The method of claim 1 wherein the receptor comprises an antibody.

4. The method of claim 1 wherein the receptor is selected from the group consisting of nucleic acids, peptides, small organic molecules and combinations thereof.

5. The method of claim 1 wherein the carrier fluid comprises water.

6. The method of claim 1 wherein the carrier fluid comprises aqueous buffer solution.

7. The method of claim 1 wherein the carrier fluid comprises phosphate buffered saline.

8. The method of claim 1 wherein the receptor solution has a viscosity less than about 10 centipoise.

9. The method of claim 1 wherein the receptor solution has a viscosity less than about 2 centipoise.

10. The method of claim 1 wherein the receptor solution further comprises receptor at a concentration of at least 0.1 mg/ml.

11. The method of claim 1 wherein the receptor solution further comprises a flow modifier.

12. The method of claim 11 wherein the flow modifier is glycerol.

13. The method of claim 1 wherein only a fraction of the receptor solution within a cell is transferred from the rotating printing cylinder to the substrate.

14. The method of claim 1 wherein the substrate comprises a thermoplastic film.

15. The method of claim 14 wherein the substrate further comprises a metal coating.

16. The method of claim 15 wherein the metal coating comprises gold.

17. The method of claim 15 wherein the receptor solution is applied to the metal coating of the thermoplastic film.

18. The method of claim 1 further comprising the step of applying surface treatment to the substrate prior to transferring the receptor solution from the rotating printing cylinder to the substrate.

19. The method of claim 18 wherein the surface treatment comprises a surfactant.

20. The method of claim 18 wherein the surface treatment comprises Corona discharge.

21. The method of claim 18 wherein the surface treatment comprises a protein.

22. The method of claim 21 wherein the protein comprises beta-caseine.

23. The method of claim 1 further comprising the step of directing a stream of air at the surface of the rotating printing cylinder prior to application of the receptor solution to the substrate.

24. The method of claim 1 further comprising the step of rinsing the printed substrate prior to drying the printed substrate.

25. The method of claim 1 wherein the drying step further comprises air drying of the receptor solution on the printed substrate at ambient conditions.

26. The method of claim 1 wherein the individual printed areas forming the pattern have a center-to-center spacing ranging from about 10 microns to about 75 microns.

27. The method of claim 1 wherein the individual printed areas forming the pattern measure from about 0.1 microns across to about 70 microns across.

28. The method of claim 27 wherein the individual printed areas forming the pattern measure from about 1 micron across to about 50 microns across.

29. The method of claim 1 wherein the contact angle of the receptor solution with respect to the surface of the substrate is less than the contact angle of the receptor solution with respect to the surface of the gravure cylinder.

30. The method of claim 29 wherein the contact angle of the receptor solution with respect to the surface of the substrate is from about 5° to about 90°.

31. The method of claim 29 wherein the contact angle of the receptor solution with respect to the surface of the substrate is from about 10° to about 80°.

32. The method of claim 29 wherein the contact angle of the receptor solution with respect to the surface of the substrate is from about 30° to about 70°.

33. The diffraction-based biosensor film made according to the process of claim 1.

34. A method for preparing a diagnostic biosensor film comprising the steps of:

a) providing a receptor solution comprising a receptor and a carrier fluid,

b) applying the receptor solution to a printing cylinder having a longitudinal axis and an engraved pattern of cells, each cell having a width, height, and depth for acceptance of the receptor solution, the printing cylinder being rotated about the longitudinal axis,

c) transferring the receptor solution from the rotating printing cylinder to a substrate, and

d) drying the printed substrate.

35. The diagnostic biosensor film made according to the process of claim 34.